CLAIMS

What is claimed is:

1. A method for tuning a signal from a channelized spectrum having a predetermined channel spacing, the method comprising

(a) mixing a signal of interest having a predetermined maximum bandwidth with a first local oscillator signal;

wherein

(b) the first local oscillator signal has a frequency that is (1) one-half of a channel spacing displaced from an integer multiple of the channel spacing and (2) is selected to frequency translate the signal of interest to within a near-baseband passband whose lower edge is spaced from DC by at least about the maximum bandwidth of the signal of interest;

whereby problems associated with 1/f noise, DC offsets, and self-mixing products are avoided or substantially diminished.

2. The method of claim 1 wherein the near-baseband passband is defined with reference to a lower frequency F1 and an upper frequency F2, wherein F1=F2-F1.

3. The method of claim 2 further comprising:

(a) mixing the signal of interest with a second local oscillator signal having the first frequency and being approximately in quadrature with the first local oscillator signal;

wherein

(b) the signal of interest lies within one of an upper high frequency spectrum of interest and a lower high frequency spectrum of interest; and

(c) the method further comprises providing spectrum coverage within one of the high frequency spectra of interest and not the other.

4. The method of claim 3 further comprising coarse-tuning the local oscillator signal by one local oscillator step from the first frequency to a second frequency an integral number of channel spacings from the first frequency.

5. The method of claim 1 wherein the spacing of the lower edge of the near-baseband passband from DC is greater than the passband's width.

6. The method of claim 5 wherein the spacing of the lower edge of the near-baseband passband from DC is about twice the passband's width.

7. The method of claim 1 further comprising mixing the signal of interest with a second local oscillator signal having the first frequency and being approximately in quadrature with the first local oscillator signal.

8. The method of claim 1 further comprising coarse-tuning the local oscillator signal by one local oscillator step from the first frequency to a second frequency an integral number of channel spacings from the first frequency.

9. The method of claim 8 wherein the second frequency is two channel spacings from the first frequency.

10. The method of claim 1 wherein:

(a) the signal of interest lies within one of an upper high frequency spectrum of interest and a lower high frequency spectrum of interest; and

(b) the method further comprises providing spectrum coverage within one of the high frequency spectra of interest and not the other.

11. The method of claim 10 further comprising switching between:

(a) providing spectrum coverage within the lower high frequency spectrum of interest and not the upper high frequency spectrum of interest; and

(b) providing spectrum coverage within the upper high frequency spectrum of interest and not the lower high frequency spectrum of interest.

12. Apparatus for tuning, from a channelized spectrum having a predetermined channel spacing, a signal of interest having a predetermined maximum bandwidth, the apparatus comprising:

(a) a local oscillator configured to generate a local oscillator signal at a frequency that is one-half of a channel spacing displaced from an integer multiple of the channel spacing; and

(b) a mixer responsive to the local oscillator signal and the signal of interest, wherein the mixer frequency translates the signal of interest;

wherein

(c) the frequency-translated signal of interest falls within a near-baseband passband spaced from DC by a frequency offset of at least about the maximum bandwidth of the signal of interest;

whereby problems associated with 1/f noise, DC offsets, and self-mixing products are avoided or substantially diminished.

13. The apparatus of claim 12 wherein the near-baseband passband is defined with reference to a lower frequency F1 and an upper frequency F2, wherein F1=F2-F1.

14. The apparatus of claim 13 further comprising:

(a) a second local oscillator configured to generate a second local oscillator signal having the first frequency and being approximately in quadrature with the first local oscillator signal; and

(b) a second mixer responsive to the second local oscillator signal and the signal of interest, wherein:

(1) the signal of interest lies within one of an upper high frequency spectrum of interest and a lower high frequency spectrum of interest; and

(2) the apparatus provides spectrum coverage within one of the high frequency spectra of interest and not the other.

15. The apparatus of claim 12 wherein the spacing of the lower edge of the near-baseband passband from DC is greater than the passband's width.

16. The apparatus of claim 12 wherein the spacing of the lower edge of the near-baseband passband from DC is about twice the passband's width.

17. The apparatus of claim 12 further comprising a second local oscillator configured to generate a second local oscillator signal having the first frequency and being approximately in quadrature with the first local oscillator signal.

18. The apparatus of claim 17 further comprising a second mixer responsive to the second local oscillator signal and the signal of interest, wherein:

(a) the signal of interest lies within one of an upper high frequency spectrum of interest and a lower high frequency spectrum of interest; and

(b) the apparatus provides spectrum coverage within one of the high frequency spectra of interest and not the other.

19. Apparatus for tuning, from a channelized spectrum having a predetermined channel spacing, a signal of interest having a predetermined maximum bandwidth, the apparatus comprising:

(a) a first local oscillator configured to generate a local oscillator signal at a frequency that is an integer multiple of the channel spacing;

(b) a second local oscillator configured to generate a second local oscillator signal having the first frequency and being approximately in quadrature with the first local oscillator signal; and

(c) a mixer responsive to the local oscillator signal and the signal of interest, wherein the mixer frequency translates the signal of interest;

wherein

(d) the frequency-translated signal of interest falls within a near-baseband passband spaced from DC by a frequency offset of at least about the maximum bandwidth of the signal of interest;

whereby problems associated with 1/f noise, DC offsets, and self-mixing products are avoided or substantially diminished.

20. The apparatus of claim 19 wherein the spacing of the lower edge of the near-baseband passband from DC is greater than the passband's width.

21. The apparatus of claim 20 wherein the spacing of the lower edge of the near-baseband passband from DC is about twice the passband's width.

22. The apparatus of claim 19 further comprising a second mixer responsive to the second local oscillator signal and the signal of interest, wherein:

(a) the signal of interest lies within one of an upper high frequency spectrum of interest and a lower high frequency spectrum of interest; and

(b) the apparatus provides spectrum coverage within one of the high frequency spectra of interest and not the other.

23. A method for tuning a channelized signal of interest from within a channelized spectrum, the method comprising:

(a) splitting an incoming signal into two signal paths;

(b) generating an approximately quadrature local oscillator signal from a local oscillator that is coarse-tunable across the channelized spectrum with a step size S;

(c) quadrature mixing the split incoming signal with the local oscillator signal, thereby:

(1) frequency translating to a near-baseband passband an upper high frequency spectrum of interest from above the frequency of the local oscillator signal and a lower high frequency spectrum of interest from below the frequency of the local oscillator signal, the near-baseband passband being sized to fit one channel and spaced from DC by at least about the passband's width; and

(2) producing I and Q signals in approximate quadrature relation; and

(d) limiting the frequency spectrum of the I and Q signals, wherein spectrum coverage is provided of a selected one of the high frequency spectra of interest and analog processing of signals at or close to DC is avoided.

24. The method of claim 23 further comprising repeating (a) through (d) in turn for a plurality of local oscillator frequencies, wherein high frequency spectra of interest tunable with the local oscillator frequencies of the plurality are interspersed between local oscillator frequencies of the plurality within the channelized spectrum.

25. The method of claim 24 wherein the near-baseband passband is defined with reference to a lower frequency F1 and an upper frequency F2, wherein F1=F2-F1.

26. The method of claim 25 further comprising providing spectrum coverage within one of the high frequency spectra of interest and not the other.

27. The apparatus of claim 23 wherein the spacing of the lower edge of the near-baseband passband from DC is greater than the passband's width.

28. The apparatus of claim 27 wherein the spacing of the lower edge of the near-baseband passband from DC is about twice the passband's width.

29. The method of claim 23 wherein limiting the frequency spectrum of the I and Q signals comprises filtering the signals in continuous-time using switched-capacitor circuitry.

30. The method of claim 23 wherein the near-baseband passband is defined with reference to a lower frequency F1 and an upper frequency F2, wherein F1=F2-F1.

31. The method of claim 23 wherein the spacing of the lower edge of the near-baseband passband from DC is greater than the passband's width.

32. The method of claim 31 wherein the spacing of the lower edge of the near-baseband passband from DC is about twice the passband's width.

33. The method of claim 23 wherein limiting the frequency spectrum of the I and Q signals comprises highpass and lowpass filtering the signals in continuous-time.

34. The method of claim 33 wherein limiting the frequency spectrum of the I and Q signals comprises filtering the signals in continuous-time using switched-capacitor circuitry.

35. The method of claim 33 wherein limiting the frequency spectrum of the I and Q signals further comprises filtering the signals in discrete-time.

36. The method of claim 23 further comprising providing spectrum coverage within one of the high frequency spectra of interest and not the other.

37. The method of claim 36 further comprising:

(a) converting the I and Q signals to digital I and Q signals; and

(b) combining the digital I and Q signals to reject an undesired mixing image.

38. The method of claim 37 further comprising correcting amplitude and phase errors between the digital I and Q signals.

39. Apparatus for tuning a channelized signal of interest from within a channelized spectrum, the apparatus comprising:

(a) an RF amplifier responsive to an incoming signal;

(b) a local oscillator that is coarse-tunable across the channelized spectrum with a step size S;

(c) first and second mixers responsive to an amplified signal from the RF amplifier and an approximately quadrature local oscillator signal from the local oscillator, wherein:

(1) the first and second mixers cooperatively frequency translate to a near-baseband passband an upper high frequency spectrum of interest from above the frequency of the local oscillator signal and a lower high frequency spectrum of interest from below the frequency of the local oscillator signal;

(2) the near-baseband passband is sized to fit one channel and spaced from DC by at least about the passband's width; and

(3) spectrum coverage is provided of a selected one of the high frequency spectra of interest; and

(d) first and second filters responsive to signals from the first and second mixers, respectively, wherein analog processing of signals at or close to DC is avoided.

40. The apparatus of claim 39 wherein the local oscillator is tunable to a plurality of local oscillator frequencies, wherein high frequency spectra of interest tunable with the local oscillator frequencies of the plurality are interspersed between local oscillator frequencies of the plurality within the channelized spectrum.

41. The apparatus of claim 40 wherein the near-baseband passband is defined with reference to a lower frequency F1 and an upper frequency F2, wherein F1=F2-F1.

42. The apparatus of claim 41 wherein spectrum coverage is provided within one of the high frequency spectra of interest and not the other.

43. The apparatus of claim 39 wherein the spacing of the lower edge of the near-baseband passband from DC is greater than the passband's width.

44. The apparatus of claim 43 wherein the spacing of the lower edge of the near-baseband passband from DC is about twice the passband's width.

45. The apparatus of claim 39 spectrum coverage is provided within one of the high frequency spectra of interest and not the other.

46. The apparatus of claim 39 wherein the filters include continuous-time switched-capacitor circuitry.

47. The apparatus of claim 39 wherein the near-baseband passband is defined with reference to a lower frequency F1 and an upper frequency F2, wherein F1=F2-F1.

48. The apparatus of claim 39 wherein the spacing of the lower edge of the near-baseband passband from DC is greater than the passband's width.

49. The apparatus of claim 48 wherein the spacing of the lower edge of the near-baseband passband from DC is about twice the passband's width.

50. The apparatus of claim 39 wherein the filters include continuous-time highpass and lowpass filters.

51. The apparatus of claim 50 wherein the filters further include continuous-time switched-capacitor circuitry.

52. The apparatus of claim 39 futher comprising discrete-time filters.